NOTE ON THE CONNECTION BETWEEN THE RAIN-FALL AT DURBAN AND MAURITIUS.

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The present notice contains the first results of an inquiry into the possibility of seasonal weather forecasts for Mauritius.

Mauritius weather being controlled to a much greater extent in winter than in summer by the number and intensity of the anticyclones, with their attendant V-shaped depressions, which pass to the south of Mauritius from the Cape towards Australia, it was thought that an examination of the weather conditions to the south-west of Mauritius in the winter months might give some idea of the subsequent weather at Mauritius. Monthly departures from average of the various meteorological elements at Durban were compared with those at Mauritius; the latter were also compared with the monthly departures from average of the pressure gradient between Durban and Mauritius *; but there appeared to be no connection between them.

The next step was to examine the weather conditions at Durban antecedent to winter droughts in Mauritius, and still there appeared to be no connection; but on reversing the argument, examining the weather conditions at Mauritius following droughts at Durban, a connection at once became apparent.

In the following table are given particulars of the droughts which have occurred at Durban since 1873—the year in which observations were commenced—and of the corresponding droughts in Mauritius.

The information for Durban has been extracted from the annual reports of the Government Astronomer, and is based upon rainfall

* The abnormality curve of pressure gradient follows very closely the abnormality curve of pressure at Durban, the departures from average being so much larger at Durban than at Mauritius.

DROUGHTS AT NATAL

	NATAL.	
Period.	Monthly percentage of Normal Rainfall.	Remarks.
1873 April to July	83, 42, 0, 69	
1874 July to October	36, 70, 53, 45	
1876 February to May	23, 59, 168, 21	Daily values not available: ? cause of excess in April.
1876 October to 1878 April	$\begin{array}{c} 41,\ 72,\ 41,\ 92,\ 56,\ 46,\\ 93,\ 3,\ 77,\ 85,\ 43,\\ 73,\ 68,\ 62,\ 52,\ 48,\\ 95,\ 65,\ 85 \end{array}$	The longest drought on record. The nearest approach to normal rainfall occurred in 1877 January, 92 per cent., 1877 April, 93 per cent., and
1878 July to December	18, 16, 5, 32, 90, 65	1878 February, 95 per cent. Practically a continuation of
1880 June to September	70, 0, 50, 31	previous drought.
1881 February to July 1881 December to 1882 March	$\begin{array}{c} 66,\ 45,\ 33,\ 20,\ 59,\ 50\\ 63,\ 73,\ 39,\ 54 \end{array}$	
1883 June to September	24, 4, 210, 24	Included as a drought pro- visionally; daily observa- tions may show that the heavy rain in August fell on
1884 July to September	18, 37, 83	one of two days only.
1885 February to 1886 January	$50, 58, 68, 57, 35, 3, \\44, 267, 63, 72, 83, \\70$	
1886 August to October 1889 June to 1890 January	36, 22, 13 32, 20, 91, 28, 93, 45, 26, 44	Total rainfall in August and October nearly normal, ow- ing to somewhat heavy rain on August 17th, 30th, and
1890 May to September	29, 42, 11, 46, 28	Most severe winter drought on
1892 March to July	27, 28, 73, 0, 49	recora.
1894 January to March 1094 June to August	39, 79, 44 82, 37, 27	The whole of the June rainfall occurred from the 25th to the 28th
1895 May to 1896 June	$74,11,86,40,42,60,\\44,232,68,83,86,\\163,57,15,82$	Severe prolonged drought bro- ken by very heavy rain on December 12th to 14th and April 7th
1897 April to September	34, 17, 535, 2, 65, 120	Severe drought broken by heavy rain on June 8th to 10th and Sontombor 10th to 11th
1898 June to September 🤘	66, 28, 150, 51	60 per cent. of the Augustrain- fall occurred on the 5th and 6th; 70 per cent. of the Sep- tember rainfall occurred on the 30th.
1899 February to 1900 May	29, 83, 45, 91, 24, 56, 17, 43, 144, 46, 75, 89, 56, 43, 47, 22	Severe prolonged drought bro- ken by very heavy rain on October 22nd.
March	00, 100, 10, 00	
1905 July to October	20, 133, 16, 27	heavy rain on August 27th. Practically a continuation of previous drought.
1904 August to November	13, 15, 58, 83	T

AND MAURITIUS.

MAURITIUS.					
Period.	Monthly percentage of Normal Rainfall.	Remarks.	ment at Natal and Mauritius (Months).		
1873 November to 1874 February	57, 89, 78, 50		7		
1875 January to April	53 33 33 92		6		
1876 March to September	58, 59, 81, 88, 85, 71, 82	Followed by a further drought in November, 57 per cent.,	?		
1877 December to 1878 March	96, 78, 63, 76	and December, 76 per cent.	?		
1979 October to 1970	02 66 110 24 00		9		
February	25, 00, 110, 54, 62		Ð		
1879 October to 1881 March	88, 28, 110, 59, 123, 42, 39, 58, 143, 93, 77, 60, 50, 42, 82, 71, 42, 32	Longest and most severe drought on record.	?		
1881 August to October 1882 April to June	58, 78, 67 51, 40, 97		6 4		
1884 January to March 1884 June to September	83, 55, 84 73, 92, 33, 66	Practically a continuation of previous drought.	7		
1884 December to 1885	19, 64, 49, 66, 70		5		
April	67 00 40 50 40 96	Vour course prolonged due ught	0		
December	$\begin{array}{c} 67, 82, 42, 58, 40, 80, \\ 62, 61, 96, 38, 44, \\ 104, 66, 48 \end{array}$	broken by normal rains in 1886 October.	9		
1889 September to 1890 January	68, 75, 52, 110, 61		3		
			,		
1890 December to 1891 February	59, 69, 68		6		
1893 February to March	53, 62		?		
1894 February to April	95, 44, 93		?		
1894 October to 1895 February	46, 91, 125, 40, 34		4		
1896 June to 1897 May	73, 79, 69, 67, 57, 69, 39, 100, 79, 36, 30, 31	Very severe prolonged drought.	?		
1897 October to 1898 Feb- ruary	92, 77, 116, 87, 53	Moderate drought broken by rains slightly above normal	6		
1898 October to 1899 January	41, 48, 50, 41	in December.	4		
1899 November to 1900 December	72, 25, 53, 80, 95, 22, 93, 43, 102, 50, 35, 76, 38, 33	Very severe prolonged drought broken by normal rains in July.	?		
1903 May to 1904 Feb- ruary	$28, 91, 36, 68, 101, 69, \\42, 50, 46, 55$	The summer drought may be considered to have com- menced in October.	5		
1904 August to December	49, 72, 73, 50, 59		?		

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observations made at the Durban Botanical Gardens from 1873–1883 and at the Government Observatory from 1884–1904. It has not been possible to form tables of monthly departures from average rainfall for the whole of Natal. Such tables are, however, very desirable, as the rainfall at Durban, particularly in the winter months, is erratic. Frequently a very dry month will show a rainfall much in excess of normal owing to floods on one or two days.

The information for Mauritius is based upon the returns from ten representative stations in different parts of the island, and may be considered as an accurate numerical statement of the droughts which have occurred.

From the preceding table it will be seen that winter droughts at Durban have invariably been followed by summer droughts in Mauritius at intervals of from three to seven months, and that prolonged droughts at Natal, or those commencing in the summer, may be either accompanied or followed by prolonged droughts in Mauritius.

With a view to ascertaining whether the interval is dependent upon the date of commencement, duration, or intensity at Durban the droughts have been grouped in the following table according to the interval between the commencement of the drought at Durban and in Mauritius.

There is some evidence to show that the interval depends upon the time of commencement of the drought at Durban, the former varying inversely with the latter, in the mean; but the interval, duration, and intensity of the Mauritius droughts appear to be independent of the duration or intensity of the Natal droughts, at least so far as winter droughts are concerned.

There is this connection, however, that whereas winter droughts at Durban are followed by summer droughts in Mauritius, prolonged droughts at Durban lasting over summer and winter, or longer, are either accompanied, or followed, by prolonged droughts in Mauritius.

The first prolonged drought at Durban, which commenced in February, 1876, and lasted practically up to December, 1878, was accompanied by a prolonged drought in Mauritius from March, 1876, to December, and followed by a second very severe drought in Mauritius from October, 1879, to March, 1881.

The second prolonged drought at Durban, from February, 1885, to January, 1886, was accompanied and followed by a prolonged drought in Mauritius from November, 1885, to December, 1886.

The third prolonged drought at Durban, from May, 1895, to June, 1896, was followed by a prolonged drought in Mauritius from June, 1896, to May, 1897.

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	Commence- ment.		1873 April 1883 June 1890 May	May 1	1874 July 1897 April	May 15	1884 July	1894 June 1898 June	June 1	1878 July 1889 June 1903 July	June 20
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The fourth prolonged drought at Durban, from February, 1899, to May, 1900, was accompanied and followed by a prolonged drought in Mauritius from November, 1899, to December, 1900.

As a large proportion of the summer rainfall at Mauritius is usually of cyclonic origin, the above results suggested that the summers following winter droughts at Durban would be characterised by the absence of cyclones in the neighbourhood of Mauritius, though it would be difficult to give a satisfactory explanation of such Upon examining the Mauritius records, however, it a connection. was found that the mean number of cyclones within the 20° square of which Mauritius is the centre was 3.3 in the summers following winter droughts at Durban, while the mean for all summers since 1873 was 3.8. As the numbers of which 3.3 is the mean varied between 0 and 6, the small difference (3.8-3.3) does not appear to have any real significance, and may possibly have changed sign had a larger or smaller area been considered, or a different number of years used. It appears, therefore, that winter droughts at Durban are not necessarily followed by an absence of cyclones in the neighbourhood of Mauritius, and hence that their effect on the non-cyclonic rain of the following summer in Mauritius is even greater than indicated by the figures given in this paper, and that after such droughts Mauritius is dependent on cyclones to a greater extent than usual for the following summer rainfall.

It remains to be seen whether further observations from stations along the east coast of South Africa will bring to light a still closer connection between the rainfall over this region and in Mauritius. Though no claim is made that an accurate monthly forecast of summer droughts in Mauritius can be made from a study of the rainfall along the east coast of South Africa during the preceding winter, yet it appears from the figures given above that one, if not the principal determining factor has been discovered. As other factors are discovered and the broader effects of solar influences become better understood, it is to be hoped that seasonal forecasts of a fair degree of accuracy will be possible.